

SEQUENCE LISTING

<110> BECKER et al.

<120> STRAIN SELECTION OF PNEUMOCOCCAL SURFACE PROTEINS

<130> 454312-2471

<140> 09/147,875

<141> 1999-05-24

<160> 28

<170> PatentIn Ver. 2.1

<210> 1

<211> 98

<212> PRT

<213> Streptococcus pneumoniae

<400> 1

Leu	Lys	Glu	Ile	Asp	Glu	Ser	Asp	Ser	Glu	Asp	Tyr	Val	Lys	Glu	Gly
1				5					10					15	

Leu	Arg	Ala	Pro	Leu	Gln	Ser	Glu	Leu	Asp	Ala	Lys	Gln	Ala	Lys	Leu
			20					25					30		

Ser	Lys	Leu	Glu	Glu	Leu	Ser	Asp	Lys	Ile	Asp	Glu	Leu	Asp	Ala	Glu
		35					40					45			

Ile	Ala	Lys	Leu	Glu	Lys	Asp	Val	Glu	Asp	Phe	Lys	Asn	Ser	Asp	Gly
	50					55						60			

Glu	Gln	Ala	Gln	Tyr	Leu	Ala	Ala	Ala	Glu	Glu	Asp	Leu	Ala	Lys	Lys
65					70					75					80

Ala	Glu	Leu	Glu	Lys	Thr	Glu	Ala	Asp	Leu	Lys	Lys	Ala	Val	His	Glu
				85					90					95	

Pro Glu

<210> 2

<211> 100

<212> PRT

<213> Streptococcus pneumoniae

<400> 2

Leu	Lys	Glu	Ile	Asp	Glu	Ser	Asp	Ser	Glu	Asp	Tyr	Val	Lys	Glu	Gly
1				5					10					15	

Leu	Arg	Ala	Pro	Leu	Gln	Ser	Glu	Leu	Asp	Ala	Lys	Gln	Ala	Lys	Leu
			20					25					30		

Ser	Lys	Leu	Glu	Glu	Leu	Ser	Asp	Lys	Ile	Asp	Glu	Leu	Asp	Ala	Glu
		35					40					45			

Ile Ala Lys Leu Glu Lys Asn Val Glu Asp Phe Lys Asn Ser Asn Gly
50 55 60

Glu Gln Ala Glu Gln Tyr Arg Ala Ala Ala Glu Glu Asp Leu Ala Ala
65 70 75 80

Lys Gln Ala Glu Leu Glu Lys Thr Glu Ala Asp Leu Lys Lys Ala Val
85 90 95

His Glu Pro Glu
100

<210> 3
<211> 100
<212> PRT
<213> Streptococcus pneumoniae

<400> 3
Leu Lys Glu Ile Asp Glu Ser Asp Ser Glu Asp Tyr Val Lys Glu Gly
1 5 10 15

Leu Arg Ala Pro Leu Gln Ser Glu Leu Asp Ala Lys Gln Ala Lys Leu
20 25 30

Ser Lys Leu Glu Glu Leu Ser Asp Lys Ile Asp Glu Leu Asp Ala Glu
35 40 45

Ile Ala Lys Leu Glu Lys Asn Val Glu Asp Phe Lys Asn Ser Asn Gly
50 55 60

Glu Glu Ala Glu Gln Tyr Arg Ala Ala Ala Gly Glu Asp Leu Ala Ala
65 70 75 80

Lys Gln Ala Glu Leu Glu Lys Thr Glu Ala Asp Leu Lys Lys Ala Val
85 90 95

His Glu Pro Glu
100

<210> 4
<211> 100
<212> PRT
<213> Streptococcus pneumoniae

<400> 4
Leu Lys Glu Ile Asp Glu Ser Asp Ser Glu Asp Tyr Val Lys Glu Gly
1 5 10 15

Glu Arg Ala Pro Leu Gln Ser Glu Leu Asp Ala Lys Gln Ala Lys Leu
20 25 30

Ser Lys Leu Glu Glu Leu Ser Asp Lys Ile Asp Glu Leu Asp Ala Glu
35 40 45

Ile	Ala	Lys	Leu	Glu	Lys	Asp	Val	Glu	Asp	Phe	Lys	Asn	Ser	Asp	Gly
50					55						60				
Glu	Gln	Ala	Gly	Gln	Tyr	Leu	Ala	Ala	Ala	Gly	Glu	Asp	Leu	Ile	Ala
65				70						75					80
Lys	Lys	Ala	Glu	Leu	Glu	Lys	Ala	Glu	Ala	Asp	Leu	Lys	Lys	Ala	Val
			85					90						95	
Asp	Glu	Pro	Glu												
	100														

<210> 5
 <211> 100
 <212> PRT
 <213> Streptococcus pneumoniae

Leu	Lys	Glu	Ile	Asp	Glu	Ser	Asp	Ser	Glu	Asp	Tyr	Val	Lys	Glu	Gly
1				5					10					15	
Glu	Arg	Ala	Pro	Leu	Gln	Ser	Glu	Leu	Asp	Ala	Lys	Gln	Ala	Lys	Leu
			20					25					30		
Ser	Lys	Leu	Glu	Glu	Leu	Ser	Asp	Lys	Ile	Asp	Glu	Leu	Asp	Ala	Glu
		35					40					45			
Ile	Ala	Lys	Leu	Glu	Lys	Asp	Val	Glu	Asp	Phe	Lys	Asn	Ser	Asp	Gly
50					55						60				
Glu	Gln	Ala	Gly	Gln	Tyr	Leu	Ala	Ala	Ala	Glu	Glu	Asp	Leu	Ile	Ala
65				70						75					80
Lys	Lys	Ala	Glu	Leu	Glu	Gln	Thr	Glu	Ala	Asp	Leu	Lys	Lys	Ala	Val
			85					90						95	
His	Glu	Pro	Glu												
	100														

<210> 6
 <211> 100
 <212> PRT
 <213> Streptococcus pneumoniae

<220>
 <221> UNSURE
 <222> (1)..(100)
 <223> amino acid 'Xaa' can be any amino acid

Leu	Lys	Glu	Ile	Asp	Glu	Ser	Asp	Ser	Glu	Asp	Tyr	Val	Lys	Glu	Gly
1				5					10					15	
Glu	Arg	Ala	Pro	Leu	Gln	Ser	Glu	Leu	Asp	Ala	Lys	Gln	Ala	Lys	Leu
			20					25					30		

Ser Lys Leu Glu Glu Xaa Ser Asp Lys Xaa Asp Glu Leu Asp Ala Glu
 35 40 45
 Ile Ala Lys Leu Glu Lys Asp Val Glu Asp Phe Lys Asn Ser Asp Gly
 50 55 60
 Glu Gln Ala Gly Gln Tyr Leu Ala Ala Ala Glu Glu Asp Leu Ile Ala
 65 70 75 80
 Lys Lys Ala Xaa Leu Glu Lys Ala Glu Ala Asp Leu Lys Lys Ala Val
 85 90 95
 Asp Glu Pro Glu
 100

<210> 7
 <211> 100
 <212> PRT
 <213> Streptococcus pneumoniae

<220>
 <221> UNSURE
 <222> (1)..(100)
 <223> amino acid 'Xaa' can be any amino acid

<400> 7
 Leu Lys Glu Ile Asp Glu Ser Asp Ser Glu Asp Tyr Glu Lys Glu Gly
 1 5 10 15
 Leu Arg Ala Pro Leu Gln Ser Lys Leu Asp Ala Lys Lys Ala Lys Leu
 20 25 30
 Ser Lys Leu Asp Glu Xaa Ser Asp Lys Xaa Asp Glu Leu Asp Ala Glu
 35 40 45
 Ile Ala Lys Leu Glu Lys Asp Val Gly Asp Phe Pro Asn Ser Asp Gly
 50 55 60
 Glu Gln Ala Gly Gln Tyr Leu Val Ala Ala Glu Lys Asp Leu Asp Ala
 65 70 75 80
 Lys Glu Ala Glu Leu Gly Asn Thr Gly Ala Asp Leu Lys Lys Ala Val
 85 90 95
 Asp Glu Pro Glu
 100

<210> 8
 <211> 100
 <212> PRT
 <213> Streptococcus pneumoniae

<400> 8
 Leu Lys Gly Ile Asp Glu Ser Asp Ser Glu Asp Tyr Val Lys Glu Gly

1	5	10	15
Leu Arg Ala	Pro Leu Gln Ser Glu Leu Asp Ala Lys Arg Thr Lys Leu		
	20	25	30
Ser Thr Leu Glu Glu Leu Ser Asp Lys Ile Asp Glu Leu Asp Ala Glu			
	35	40	45
Ile Pro Lys Leu Glu Lys Asn Val Glu Tyr Phe Lys Leu Thr Asp Ala			
	50	55	60
Glu Gln Thr Glu Gln Tyr Leu Ala Ala Ala Glu Lys Asp Leu Ala Asp			
	65	70	75
Lys Lys Ala Glu Leu Glu Lys Thr Glu Ala Asp Leu Lys Lys Ala Val			
	85	90	95
His Glu Pro Glu			
	100		

<210> 9
 <211> 101
 <212> PRT
 <213> Streptococcus pneumoniae

<400> 9
Leu Lys Glu Ile Asp Glu Ser Asp Ser Glu Asp Tyr Val Lys Glu Gly
1 5 10 15
Leu Arg Val Pro Leu Gln Ser Glu Leu Asp Val Lys Gln Ala Lys Leu
20 25 30
Leu Lys Leu Glu Glu Leu Ser Asp Lys Ile Asp Glu Leu Asp Ala Glu
35 40 45
Ile Ala Lys Asn Leu Lys Lys Asp Val Glu Asp Phe Gln Asn Ser Gly
50 55 60
Gly Gly Tyr Ser Ala Leu Tyr Leu Glu Ala Ala Glu Lys Asp Leu Val
65 70 75 80
Ala Lys Lys Ala Glu Leu Glu Lys Thr Glu Ala Asp Leu Lys Lys Ala
85 90 95
Val His Glu Pro Glu
100

<210> 10
 <211> 100
 <212> PRT
 <213> Streptococcus pneumoniae

<400> 10
Leu Lys Glu Ile Asp Glu Ser Asp Ser Glu Asp Tyr Ala Lys Glu Gly
1 5 10 15

Phe Arg Ala Pro Leu Gln Ser Lys Leu Asp Ala Lys Lys Ala Lys Leu
 20 25 30
 Ser Lys Leu Glu Glu Leu Ser Asp Lys Ile Asp Glu Leu Asp Ala Glu
 35 40 45
 Ile Ala Lys Leu Glu Cys Val Gln Leu Lys Asp Ala Glu Gly Asn Asn
 50 55 60
 Asn Val Glu Ala Tyr Phe Lys Glu Gly Leu Glu Lys Thr Thr Ala Glu
 65 70 75 80
 Lys Lys Ala Glu Leu Glu Lys Ala Glu Ala Asp Leu Lys Lys Ala Val
 85 90 95
 Asp Glu Pro Glu
 100

<210> 11
 <211> 99
 <212> PRT
 <213> Streptococcus pneumoniae

<400> 11
 Leu Lys Glu Ile Asp Glu Ser Asp Ser Glu Asp Tyr Val Lys Glu Gly
 1 5 10 15
 Phe Arg Ala Pro Leu Gln Ser Glu Leu Asp Ala Lys Gln Ala Lys Leu
 20 25 30
 Ser Lys Leu Glu Glu Leu Ser Asp Lys Ile Asp Glu Leu Asp Ala Glu
 35 40 45
 Ile Ala Lys Leu Glu Asp Gln Leu Lys Ala Ala Glu Glu Asn Asn Asn
 50 55 60
 Val Glu Asp Tyr Phe Lys Glu Gly Leu Glu Lys Thr Ile Ala Ala Lys
 65 70 75 80
 Lys Ala Glu Leu Glu Lys Thr Glu Ala Asp Leu Lys Lys Ala Val Asn
 85 90 95
 Glu Pro Glu

<210> 12
 <211> 100
 <212> PRT
 <213> Streptococcus pneumoniae

<400> 12
 Leu Lys Glu Ile Asp Glu Ser Glu Ser Glu Asp Tyr Ala Lys Glu Gly
 1 5 10 15

Phe Arg Ala Pro Leu Gln Ser Lys Leu Asp Ala Lys Gln Ala Lys Leu
 20 25 30
 Ser Lys Leu Glu Glu Leu Ser Asp Lys Ile Asp Glu Leu Asp Ala Glu
 35 40 45
 Ile Ala Lys Leu Glu Asp Gln Leu Lys Lys Ala Ala Glu Glu Asn Asn
 50 55 60
 Asn Val Glu Asp Tyr Phe Lys Glu Gly Leu Glu Lys Thr Ile Ala Ala
 65 70 75 80
 Lys Lys Ala Glu Leu Glu Lys Thr Glu Ala Asp Leu Lys Lys Ala Val
 85 90 95
 Asn Glu Pro Glu
 100

<210> 13
 <211> 99
 <212> PRT
 <213> Streptococcus pneumoniae

<400> 13
 Leu Lys Glu Ile Asp Glu Ser Glu Ser Glu Asp Tyr Ala Lys Glu Gly
 1 5 10 15
 Phe Arg Ala Pro Leu His Ser Lys Leu Asp Ala Lys Gln Ala Lys Leu
 20 25 30
 Ser Lys Leu Glu Glu Leu Ser Asp Lys Ile Asp Glu Leu Asp Ala Glu
 35 40 45
 Ile Ala Lys Leu Glu Asp Gln Leu Lys Ala Val Glu Glu Asn Asn Asn
 50 55 60
 Val Glu Asp Tyr Ser Thr Glu Gly Leu Glu Lys Thr Ile Ala Ala Lys
 65 70 75 80
 Lys Thr Glu Leu Glu Lys Thr Glu Ala Asp Leu Lys Lys Ala Val Asn
 85 90 95
 Glu Pro Glu

<210> 14
 <211> 99
 <212> PRT
 <213> Streptococcus pneumoniae

<220>
 <221> UNSURE
 <222> (1)..(99)
 <223> amino acid 'Xaa' can be any amino acid

<400> 14

Leu Lys Asp Ile Asp Glu Ser Asp Ser Glu Asp Tyr Ala Lys Glu Gly
1 5 10 15
Glu Arg Ala Pro Leu Gln Ser Glu Leu Asp Thr Lys Lys Ala Lys Leu
20 25 30
Leu Lys Leu Glu Glu Leu Ser Gly Lys Ile Glu Glu Leu Asp Ala Glu
35 40 45
Ile Xaa Glu Leu Glu Val Gln Leu Lys Asp Ala Glu Gly Asn Asn Asn
50 55 60
Val Glu Ala Tyr Phe Lys Glu Gly Leu Glu Lys Thr Thr Ala Glu Lys
65 70 75 80
Lys Ala Glu Leu Glu Lys Ala Glu Ala Asp Leu Lys Lys Ala Val Asp
85 90 95
Glu Pro Glu

<210> 15

<211> 99

<212> PRT

<213> Streptococcus pneumoniae

<400> 15

Leu Glu Glu Ile Asn Glu Ser Asp Ser Glu Asp Tyr Ala Lys Glu Gly
1 5 10 15
Phe Arg Ala Pro Leu Gln Ser Lys Leu Asp Ala Lys Lys Ala Lys Leu
20 25 30
Leu Lys Leu Glu Glu Leu Ser Gly Lys Ile Glu Glu Leu Asp Ala Glu
35 40 45
Ile Ala Glu Leu Glu Val Gln Leu Lys Asp Ala Glu Gly Asn Asn Asn
50 55 60
Val Glu Ala Tyr Phe Lys Glu Gly Leu Glu Lys Thr Thr Ala Glu Lys
65 70 75 80
Lys Ala Glu Leu Glu Lys Ala Glu Ala Asp Leu Lys Lys Ala Val Asp
85 90 95
Glu Pro Glu

<210> 16

<211> 99

<212> PRT

<213> Streptococcus pneumoniae

<400> 16

Leu Lys Glu Ile Asp Glu Ser Asp Ser Glu Asp Tyr Leu Lys Glu Gly
 1 5 10 15
 Glu Arg Ala Pro Leu Gln Ser Lys Leu Asp Thr Lys Lys Ala Lys Leu
 20 25 30
 Ser Lys Leu Glu Glu Leu Ser Asp Lys Ile Asp Glu Leu Asp Ala Glu
 35 40 45
 Ile Ala Lys Leu Glu Val Gln Leu Lys Asp Ala Glu Gly Asn Asn Asn
 50 55 60
 Val Glu Ala Tyr Phe Lys Glu Gly Leu Glu Lys Thr Thr Ala Glu Lys
 65 70 75 80
 Lys Ala Glu Leu Glu Lys Ala Glu Ala Asp Leu Lys Lys Ala Val Asp
 85 90 95
 Glu Pro Glu

<210> 17
 <211> 99
 <212> PRT
 <213> Streptococcus pneumoniae

<220>
 <221> UNSURE
 <222> (1)..(99)
 <223> amino acid 'Xaa' can be any amino acid

<400> 17
 Pro Lys Arg Ile Met Ser Leu Ser Gln Lys Val Xaa Leu Lys Xaa Val
 1 5 10 15
 Cys Arg Ala Pro Leu Gln Ser Lys Leu Asp Ala Gln Lys Ala Glu Leu
 20 25 30
 Leu Lys Leu Glu Glu Leu Ser Gly Lys Ile Lys Glu Leu Asp Ala Glu
 35 40 45
 Ile Ala Glu Leu Glu Val Gln Leu Lys Asp Ala Glu Gly Asn Asn Asn
 50 55 60
 Val Glu Ala Tyr Phe Lys Glu Gly Leu Glu Lys Thr Thr Ala Glu Lys
 65 70 75 80
 Lys Ala Glu Leu Glu Xaa Ala Xaa Ala Asp Leu Lys Lys Ala Val Asp
 85 90 95
 Glu Pro Glu

<210> 18
 <211> 102

<212> PRT

<213> Streptococcus pneumoniae

<400> 18

Leu Ala Lys Lys Gln Thr Glu Leu Glu Lys Leu Leu Asp Leu Asp Pro
1 5 10 15

Glu Gly Lys Thr Gln Asp Glu Leu Asp Lys Glu Ala Glu Ala Glu Leu
20 25 30

Asp Lys Lys Ala Asp Glu Leu Pro Asn Lys Val Ala Asp Leu Glu Lys
35 40 45

Glu Ile Ser Asn Leu Glu Ile Leu Leu Gly Gly Ala Asp Ser Glu Asp
50 55 60

Asp Thr Ala Ala Leu Pro Asn Lys Leu Ala Thr Lys Lys Ala Glu Leu
65 70 75 80

Glu Lys Thr Gln Lys Glu Leu Asp Ala Ala Leu Asn Glu Leu Gly Pro
85 90 95

Asp Gly Asp Glu Glu Glu
100

<210> 19

<211> 80

<212> PRT

<213> Streptococcus pneumoniae

<400> 19

Leu Asp Lys Glu Ala Gly Glu Ala Glu Leu Asp Lys Lys Ala Asp Gly
1 5 10 15

Leu Pro Asn Lys Val Ser Asp Leu Glu Lys Glu Ile Ser Asn Leu Glu
20 25 30

Ile Leu Leu Gly Gly Ala Asp Ser Glu Asp Asp Thr Ala Ala Leu Pro
35 40 45

Asn Lys Leu Ala Thr Lys Lys Ala Glu Leu Glu Lys Thr Gln Lys Glu
50 55 60

Leu Asp Ala Ala Leu Asn Glu Leu Gly Pro Asp Gly Asp Glu Glu Glu
65 70 75 80

<210> 20

<211> 104

<212> PRT

<213> Streptococcus pneumoniae

<400> 20

Leu Ala Lys Lys Gln Thr Glu Leu Glu Lys Leu Leu Asp Ser Leu Asp
 1 5 10 15
 Pro Glu Gly Lys Thr Gln Asp Glu Leu Asp Lys Glu Ala Glu Glu Ala
 20 25 30
 Glu Leu Asp Lys Lys Ala Asp Glu Leu Pro Asn Lys Val Ala Asp Leu
 35 40 45
 Glu Lys Glu Ile Ser Asn Leu Glu Ile Leu Leu Gly Gly Ala Asp Ser
 50 55 60
 Glu Asp Asp Thr Ala Ala Leu Pro Asn Lys Leu Ala Thr Lys Lys Ala
 65 70 75 80
 Glu Leu Glu Lys Thr Gln Lys Glu Leu Asp Ala Ala Leu Asn Glu Leu
 85 90 95
 Gly Pro Asp Gly Asp Glu Glu Glu
 100

<210> 21
 <211> 104
 <212> PRT
 <213> Streptococcus pneumoniae

<400> 21
 Leu Ala Lys Lys Gln Thr Glu Leu Glu Lys Leu Leu Asp Asn Leu Asp
 1 5 10 15
 Pro Glu Gly Lys Thr Gln Asp Glu Leu Asp Lys Glu Ala Ala Glu Ala
 20 25 30
 Glu Leu Asp Lys Lys Ala Asp Glu Leu Pro Asn Lys Val Ala Asp Leu
 35 40 45
 Glu Lys Glu Ile Ser Asn Leu Glu Ile Leu Leu Gly Gly Ala Asp Pro
 50 55 60
 Glu Asp Asp Thr Ala Ala Leu Pro Asn Lys Leu Ala Thr Lys Lys Ala
 65 70 75 80
 Glu Leu Glu Lys Thr Gln Lys Glu Leu Asp Ala Ala Leu Asn Glu Leu
 85 90 95
 Gly Pro Asp Gly Asp Glu Glu Glu
 100

<210> 22
 <211> 106
 <212> PRT
 <213> Streptococcus pneumoniae

<400> 22
 Leu Glu Lys Ala Glu Ala Glu Leu Glu Asn Leu Leu Ser Thr Leu Asp

1	5	10	15												
Pro	Glu	Gly	Lys	Thr	Gln	Asp	Glu	Leu	Asp	Lys	Glu	Ala	Ala	Glu	Ala
			20					25					30		
Glu	Leu	Asn	Lys	Lys	Val	Glu	Ala	Leu	Pro	Asn	Gln	Val	Glu	Leu	Glu
		35					40					45			
Glu	Glu	Leu	Ser	Lys	Leu	Glu	Asp	Asn	Leu	Lys	Asp	Ala	Glu	Thr	Asn
		50				55					60				
Val	Glu	Asp	Tyr	Ile	Lys	Glu	Gly	Leu	Glu	Glu	Ala	Ile	Ala	Thr	Lys
		65			70					75					80
Gln	Ala	Glu	Leu	Glu	Lys	Thr	Pro	Lys	Glu	Leu	Asp	Ala	Ala	Leu	Asn
				85					90						95
Glu	Leu	Gly	Pro	Asp	Gly	Asp	Glu	Glu	Glu						
			100					105							

<210> 23
 <211> 108
 <212> PRT
 <213> Streptococcus pneumoniae

<400> 23															
Leu	Glu	Lys	Ala	Glu	Ala	Glu	Leu	Glu	Asn	Leu	Leu	Ser	Thr	Leu	Asp
1					5				10					15	
Pro	Glu	Gly	Lys	Thr	Gln	Asp	Glu	Leu	Asp	Lys	Glu	Ala	Ala	Glu	Ala
			20					25					30		
Glu	Leu	Asn	Lys	Lys	Val	Glu	Ala	Leu	Pro	Asn	Gln	Val	Ser	Glu	Leu
		35					40					45			
Glu	Glu	Glu	Leu	Ser	Lys	Leu	Glu	Asp	Asn	Leu	Lys	Asp	Ala	Glu	Thr
		50				55					60				
Asn	Asn	Val	Glu	Asp	Tyr	Ile	Lys	Glu	Gly	Leu	Glu	Glu	Ala	Ile	Ala
		65			70					75					80
Thr	Lys	Gln	Ala	Glu	Leu	Glu	Lys	Thr	Pro	Lys	Glu	Leu	Asp	Ala	Ala
				85					90					95	
Leu	Asn	Glu	Leu	Gly	Pro	Asp	Gly	Asp	Glu	Glu	Glu				
			100					105							

<210> 24
 <211> 108
 <212> PRT
 <213> Streptococcus pneumoniae

<400> 24															
Leu	Glu	Lys	Ala	Gly	Ala	Gly	Leu	Glu	Asn	Leu	Leu	Ser	Thr	Leu	Asp
1					5				10					15	

Pro Glu Gly Lys Thr Gln Asp Glu Leu Asp Lys Glu Ala Ala Glu Ala
 20 25 30
 Glu Leu Asn Lys Lys Val Glu Ala Leu Pro Asn Gln Val Ala Glu Leu
 35 40 45
 Glu Glu Glu Leu Ser Lys Leu Glu Asp Asn Leu Lys Asp Ala Glu Thr
 50 55 60
 Asn His Val Glu Asp Tyr Ile Lys Glu Gly Leu Glu Glu Ala Ile Ala
 65 70 75 80
 Thr Lys Gln Ala Glu Leu Glu Lys Thr Pro Lys Glu Leu Asp Ala Ala
 85 90 95
 Leu Asn Glu Leu Gly Pro Asp Gly Asp Glu Glu Glu
 100 105

<210> 25
 <211> 108
 <212> PRT
 <213> Streptococcus pneumoniae

<400> 25
 Leu Glu Asp Ala Glu Leu Glu Leu Glu Lys Val Leu Ala Thr Leu Asp
 1 5 10 15
 Pro Glu Gly Lys Thr Gln Asp Glu Leu Asp Lys Glu Ala Ala Glu Ala
 20 25 30
 Glu Leu Asn Glu Lys Val Glu Ala Leu Gln Asn Gln Val Ala Glu Leu
 35 40 45
 Glu Glu Glu Leu Ser Lys Leu Glu Asp Asn Leu Lys Asp Ala Glu Thr
 50 55 60
 Asn Asn Val Glu Asp Tyr Ile Lys Glu Gly Leu Glu Glu Ala Ile Ala
 65 70 75 80
 Thr Lys Lys Ala Glu Leu Glu Lys Thr Gln Lys Glu Leu Asp Ala Ala
 85 90 95
 Leu Asn Glu Leu Gly Pro Asp Gly Asp Glu Glu Glu
 100 105

<210> 26
 <211> 108
 <212> PRT
 <213> Streptococcus pneumoniae

<220>
 <221> UNSURE
 <222> (1)..(108)
 <223> amino acid 'Xaa' can be any amino acid

<400> 26

Leu Glu Lys Ala Glu Ala Glu Leu Glu Asn Leu Leu Ser Thr Leu Asp
1 5 10 15

Pro Gly Gly Lys Thr Gln Asp Glu Leu Asp Lys Gly Ala Ala Glu Ala
20 25 30

Glu Leu Asn Lys Lys Val Glu Ala Leu Pro Asn Pro Val Xaa Glu Leu
35 40 45

Glu Glu Glu Leu Ser Pro Pro Glu Asp Asn Leu Lys Asp Ala Glu Thr
50 55 60

Asn His Val Glu Asp Tyr Ile Lys Glu Gly Leu Glu Glu Ala Ile Ala
65 70 75 80

Thr Lys Gln Ala Glu Leu Glu Glu Thr Pro Gln Glu Val Asp Ala Ala
85 90 95

Leu Asn Asp Leu Val Pro Asp Gly Gly Glu Glu Glu
100 105

<210> 27

<211> 119

<212> PRT

<213> Streptococcus pneumoniae

<400> 27

Leu Glu Asp Ser Gly Leu Gly Leu Glu Lys Val Leu Ala Thr Leu Asp
1 5 10 15

Pro Gly Gly Glu Thr Pro Asp Gly Leu Asp Lys Glu Ala Ser Glu Asp
20 25 30

Ser Asn Ile Gly Ala Leu Pro Asn Gln Val Ser Asp Leu Glu Asn Gln
35 40 45

Val Ser Glu Leu Asp Arg Glu Val Thr Arg Leu Pro Ser Asp Leu Lys
50 55 60

Asp Thr Glu Gly Asn Asn Val Gly Asp Tyr Val Lys Gly Gly Leu Glu
65 70 75 80

Lys Ala Leu Thr Asp Glu Lys Val Gly Leu Asn Asn Thr Pro Lys Ala
85 90 95

Leu Asp Thr Ala Pro Lys Ala Leu Asp Thr Ala Leu Asn Glu Leu Gly
100 105 110

Pro Asp Gly Asp Glu Glu Glu
115

<210> 28

<211> 96

<212> PRT

<213> Streptococcus pneumoniae

<400> 28

Gln Ala Leu Tyr Glu Ser Thr Gln Glu Gln Ile Glu Glu Leu Lys Asp
1 5 10 15

Tyr Asn Glu Gln Ile Ser Glu Gly Glu Glu Thr Leu Ile Leu Ala Ile
20 25 30

Gln Asn Lys Ile Ser Asp Leu Asp Asp Lys Ile Ala Glu Ala Glu Lys
35 40 45

Lys Leu Ala Asp Ser Gln Asn Gly Glu Gly Val Glu Asp Tyr Trp Thr
50 55 60

Ser Gly Asp Glu Asp Lys Leu Glu Lys Leu Gln Ala Glu Gln Asp Glu
65 70 75 80

Leu Gln Ala Glu Leu Asp Gln Leu Leu Asp Glu Val Asp Gly Gln Glu
85 90 95